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Drivers of HIV Infection Among Cisgender and Transgender Female Sex Worker Populations in Baltimore City: Results From the SAPHIRE Study

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Abstract

Objective: To determine and compare risk factors for HIV infection among cisgender female sex workers (CFSWs) and transgender female sex workers (TFSWs).

Design: Baseline data from a cohort study (SAPHIRE) of street-based CFSW and TFSW in Baltimore, MD.

Methods: Women were queried about individual (eg, drug use), interpersonal (eg, sexual abuse), and structural (eg, housing) risk factors and questioned on their sex work risk environment. Women were tested for HIV/sexually transmitted infections. We used logistic regression to identify key risk factors for prevalent HIV in each population.

Results: We recruited 262 CFSW and 62 TFSW between 2016 and 2017. Compared with TFSW, CFSW were more likely to be white (66% vs. 0%), recently homeless (62% vs. 23%, $P < 0.001$), regularly gone to sleep hungry (54% vs. 16%, $P < 0.001$), and to inject drugs (71% vs. 4%, $P < 0.001$). HIV prevalence was 8 times greater in TFSW than in CFSW (40% vs. 5%, $P < 0.001$). All participants reported high rates of lifetime physical and sexual violence. Cocaine injection [adjusted odds ratio (aOR) = 3.65, 95% confidence interval (CI): 1.12 to 11.88], food insecurity (aOR = 1.92, 95% CI: 1.22 to 3.04), and >5 years in sex work (aOR = 5.40, 95% CI: 2.10 to 13.90) were independently associated with HIV among CFSW. Childhood sexual abuse (aOR = 4.56, 95% CI: 1.20 to 17.32), being in sex work due to lack of opportunities (aOR = 4.81, 95% CI: 1.29 to 17.90), and >5 years in sex work (aOR = 5.62, 95% CI: 1.44 to 21.85) were independently associated with HIV among TFSW.

Conclusions: Although distinct, both populations share a history of extensive childhood abuse and later life structural vulnerability, which drive their engagement in street-based sex work and their HIV risk profiles.

INTRODUCTION

Three decades into the HIV epidemic, high HIV/sexually transmitted infection (STI) rates persist among cisgender female sex workers (CFSWs)¹⁻⁴ and transgender female sex workers (TFSWs) worldwide,⁵ yet research in the United States is scarce.^{6,7} Globally, women who exchange sex for money, drugs, or goods have an elevated risk of HIV, other STIs, and violence compared with similarly aged populations.^{8,9} The global HIV burden among all FSWs has remained relatively constant, an estimate prevalence of 10.4%.¹⁰ One of the few HIV prevalence studies among TFSWs found an HIV prevalence estimate of 29.9% among transwomen with a history of sex work in San Francisco, CA.¹¹ However, the extent of homogeneity or divergence between CFSW and TFSW HIV risk factors is poorly understood. CFSW and TFSW possess similar structural and behavioral vulnerabilities that are both drivers and consequences of engagement in street-based sex work.⁵ Yet, there are also markedly different structural, interpersonal, and individual/biological factors that could shape their HIV risk beyond involvement in sex work.¹²⁻¹⁷ Studies that better characterize HIV risk among these populations are needed to inform comprehensive interventions that address women's shared needs as sex workers, while also identifying needs unique to each population.

The modest body of research among CFSWs in the United States documents elevated HIV/STI rates, echoing findings in a more robust global body of research.^{1,2,18,19} In a meta-analysis of studies in the United States examining HIV among CFSWs, only 2 of the 14 had occurred within the past 10 years.²⁰ A recent analysis among the Centers for Disease Control and Prevention's National HIV Behavioral Surveillance wave of high-risk heterosexuals ²¹, found that 18% of cisgender women traded sex, and that their HIV prevalence was 4.1% compared with 2.5% among nontraders.²² Several studies in the United States have characterized HIV among transgender women, which have found HIV prevalence estimates from 35% to 40%, with a higher burden of 56% among African-American transgender women.²³⁻²⁵ Less attention was paid to TFSW and little disaggregation of HIV prevalence among TFSW.⁵ A recent meta-analysis of 29 US studies estimated HIV prevalence among transgender women in the United States to be 21.7% with a 34-fold increased odds of HIV infection compared with all reproductive age adults.¹ Transgender women have high lifetime probabilities of engagement in sex work, largely due to stigma and discrimination, limited employment opportunities, and need for gender affirmation.²⁵⁻²⁹

HIV vulnerabilities of CFSW and TFSW populations in the United States and elsewhere include shared behavioral risk factors associated with high rates of condomless sex and multiple high-risk sex partners.^{2,30,31} But TFSWs are more likely than CFSW to engage in anal sex,³²⁻³⁴ specifically condomless receptive anal intercourse, an extremely efficacious method of HIV transmission.³⁵ Conversely, among CFSWs, high rates of bacterial STIs and their synergistic relationship to HIV compounds risk.⁸ At an interpersonal level, studies have shown that TFSWs are more likely to use condoms with clients than intimate partners.^{11,36} Furthermore, studies among CFSWs have shown intimate partner violence to be as important to HIV risk as client violence.³⁷

Structural risk factors indirectly increase HIV risk, decreasing women's sexual control and negotiating power, as well as reducing access to HIV-related services.³⁸ Distinctive contexts of vulnerability (eg, TFSW's gender identity and sexual orientation) and the intersectionality of differing characteristics in both populations (eg, race and injecting drug use) are important to women's unique experiences of stigma, discrimination, and social exclusion.^{39,40} However, TFSW and CFSW also share similar types of structural vulnerability resulting from their marginalization and the illicit nature of sex work. Our study positions women's HIV risk within a broader context of economic, cultural, and social marginalization using the risk environment framework and theory of structuration.^{7,41} Rhodes defines the risk environment as "the space, either social or physical, in which factors increase the risk of harm occurring" (pg. 193).⁷ The macroaspects of the risk environment include the negative features such as criminalization of drugs and poverty (eg, abandoned housing). The microenvironment includes the immediate social setting and local context of drug use as the impact of policing.⁵³ The impact of this context is further explained by Gidden's theory of structuration, articulating how women's vulnerabilities are created by the result of distal social structures.⁴¹ Structural vulnerability refers to the *positionality* of an individual in a hierarchical social order.⁴¹ Street-based sex workers societal position is frequently characterized by such factors as limiting social and economic opportunities (eg, poverty and housing instability) and extensive exposure to egregious police practices.⁴²⁻⁴⁴ Distal sociostructural factors such as these shape more situational and individual HIV risk factors (eg, depression and substance use).^{1,45,46} Reduced legal protections, in particular criminalization, represents an important structural risk factor in the lives of street-based CFSW and TFSW.⁴⁷⁻⁴⁹ Women engaged in street-based compared with other forms of sex work are exposed to higher rates of occupational violence and victimization, influenced by a punitive legal environment, often characterized by police abuse.⁴²⁻⁴⁴

This study seeks to better characterize the shared and distinct structural vulnerabilities of a TFSW and CFSW population in a single setting; and unpack how sociostructural factors synergistically and independently drive women's entry into sex work and shape the context in which HIV infection and risk-taking occur.

METHODS

The study was conducted in Baltimore city, MD (USA), which suffers from high rates of poverty, unemployment, drug use, and violence. Nearly 23% of Baltimore's population lives below the poverty line, and close to half of those in poverty have incomes below 50% of the poverty line.⁵⁰ CFSWs work in a number of areas of the city, and predominantly in close proximity to open-air drug markets and poor residential neighborhoods. Conversely, TFSWs were primarily recruited from a singular and geographically distinct residential neighborhood, which is the primary TFSW stroll in Baltimore. The solicitation, buying, and selling of sex are all illegal in Baltimore, MD.

Study Participants

The Sex workers And Police Promoting Health In Risky Environments (SAPPHIRE) study is a prospective cohort of cisgender and transgender women involved in street-based sex work, recruited between April 2016 and August 2017, consisting of 5 study visits in total (baseline, 3-, 6-, 9-, and 12-month follow-up). SAPPHIRE's broad goal was to examine the role of the police in the HIV risk environment of street-based sex workers. Targeted sampling was used to recruit women from the street across 15 identified zones, 12 zones for cis women and 3 zones for trans women.⁵¹ Details of the study's novel-targeted sampling methods were described elsewhere. But briefly, locations were selected through mapping of arrest data and information collected through ride-alongs with the Baltimore City Police Department. During a given 3-4 hour recruitment period, study staff approached single women on corners and walking along the street and were visually soliciting clients. Eligibility criteria were: (1) age ≥ 15 years; (2) sold or traded oral, vaginal, or anal sex "for money or things such as food, drugs, or favors"; (3) picked up clients on the street or at public places ≥ 3 times in the past 3 months; and (4) willing to undergo HIV and STI testing. Exclusion criteria were: (1) identifying as male or a man. Women were categorized as either CFSW or TFSW, where "transgender female" refers to women who are assigned male at birth and identify with a gender identity other than male.

Participants completed a 50-minute interviewer-administered computer-assisted personal interview survey. The survey included sections on demographics, housing, finances, sex work history, characteristics and behaviors, police encounters, incarceration, sexual and drug use behaviors, health service access, childhood abuse, and mental health.

Participants were tested for HIV using an OraQuick Advanced Rapid HIV-1/2 test kit (Orasure Technologies, Bethlehem, PA). Results were given at the end of the interview, along with the opportunity to receive referrals to a range of local health and social service organizations (eg, case management, counseling, and drug treatment programs). In addition, biological specimens were collected for STI testing using self-administered vaginal swabs for CFSW, and urine collection and rectal swab samples for TFSW, which were sent for gonorrhea (GC), chlamydia (CT), and trichomonas laboratory testing. Baltimore City Health Department clinic specialists received positive STI results for follow-up. Participants received a prepaid \$70 VISA gift card for completing the baseline visit. The study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Measures

Survey items were informed by the risk environment framework and theory of structuration as well as drawn from existing validated scales, our previous studies,^{52,53} and the expertise of the SAPPHIRE Community Advisory Board, a group comprised current and former sex workers. Childhood (<18 years) abuse was defined as ever being pressured or forced into sexual intercourse or sexual touching, or being hit, punched, slapped, or otherwise physically hurt by someone causing marks or physical injury. Structural vulnerability measures included: housing instability indicated by homelessness in the past 3 months; financial instability measured by legal unemployment and no monthly savings in the past 3 months; food insecurity defined as going to sleep hungry at least once a week; limited education measured by not completing high school; and criminal justice involvement measured by ever having been arrested or incarcerated in Baltimore city. Reasons for current sex work were captured using "What are the top 3 reasons you currently sell sex" with 9 response options to choose from including "no job opportunities" and an "other" category with an open response field.

Client and police violence items were adapted from the Revised Conflict Tactics Scale,⁵⁴ a widely used scale designed for capturing intimate partner violence. Sexual violence for each perpetrator type was defined as being involuntarily pressured or forced into sexual intercourse. Physical violence was defined as being hit, punched, slapped, or otherwise physically hurt, or being threatened or hurt with a weapon. Clients were defined as "people you've had oral, vaginal, or anal sex with for money, food, drugs, or favors."

Statistical Analyses

The analytic sample was comprised 313 sex workers, with CFSW ($n = 250$) and TFSW ($n = 63$). Acceptance of study participation for eligible women was high: 63 transgender women were eligible to enroll and 63 (100%) agreed to participate, and 265 cisgender women were eligible to enroll and 251 (95%) agreed to participate. The reasons cited for declined enrollment were (1) study staff had doubts that participant could adequately answer the survey (ie, too high), (2) not enough time to complete the survey, and (3) not interested in enrolling. The sample excluded participants who did not have a valid HIV rapid test result ($n = 1$) or were born intersex ($n = 1$). Differences between CFSW and TFSW in sociodemographics, structural vulnerability, HIV/STI infection, childhood abuse, sex work history, recent sex work characteristics, police interactions, condom use, substance use, and mental health symptoms were compared using Pearson $[\chi]^2$ tests with $P < 0.05$ indicating statistical significance.

The correlates of prevalent HIV infection were modeled separately for cisgender and transgender samples using bivariate logistic regression with variance clustered for zone of recruitment for the CFSW model. Given that all but 3 of the 63 TFSWs were recruited from a single zone, no variance adjustment for clustering was applied for the TFSW models. Covariates significant at the $P < 0.20$ level for either CFSW or TFSW were reported and considered for inclusion in multivariable logistic regression models. Backward stepwise selection was used with covariates at $P > 0.15$ removed in selecting the final model. Multicollinearity was assessed by calculating variance inflation factors. All analyses were conducted in Stata/SE 14.2 (College Station, TX).

RESULTS

Demographic and Structural Vulnerability Characteristics

Compared with TFSWs, CFSWs were significantly older (36 vs. 30 years, $P < 0.001$), more likely to be non-Hispanic white (66% vs. 0%), and less likely to be non-Hispanic black (23% vs. 76%, $P < 0.001$ overall) (Table 1). The field team encountered 1 or 2 white TFSW during the course of recruitment, and they were either ineligible or did not want to participate. There were a number of differences between the 2 populations in terms of structural vulnerability. CFSWs had higher rates of recent (past 3 month) homelessness (62% vs. 24%, $P < 0.001$), an absence of monthly savings (90% vs. 52%, $P < 0.001$), have gone to sleep hungry more than once a week (54% vs. 16%, $P < 0.001$), not completed high school (52% vs. 29%, $P = 0.002$), had been incarcerated (69% vs. 54%, $P = 0.026$), and were legally unemployed (92% vs. 79%, $P = 0.004$). Almost all CFSWs and TFSWs had been previously arrested (82% vs. 81%).

	CFSW N = 250	TFSW N = 62	P	Total N = 312
Age, mean (SD)	36 (9)	30 (10)	<0.001	34 (9)
Race/ethnicity				
Non-Hispanic white	166 (66.4)	0 (0.0)		166 (53.2)
Non-Hispanic black	57 (22.8)	47 (75.8)		104 (33.3)
Hispanic or other	27 (10.8)	15 (24.2)	—	42 (13.5)
In a relationship or married	84 (33.6)	19 (30.6)	0.644	103 (33.0)
Childhood abuse				
Sexual	82 (33.9)	21 (35.0)	0.87	103 (33.0)
Physical	103 (42.7)	16 (26.2)	0.018	119 (39.4)
Structural vulnerability				
Housing instability				
Homeless, past 3 mo	156 (62.4)	14 (22.6)	<0.001	170 (54.5)
Financial instability				
Legally unemployed in the past 3 mo	229 (91.6)	62 (100.0)	—	291 (93.3)
No monthly savings	224 (89.6)	31 (50.0)	<0.001	255 (81.7)
Food insecurity				
Went to sleep hungry >once a week	135 (54.0)	10 (16.1)	<0.001	145 (46.5)
Limited education				
Did not complete high school	131 (52.4)	19 (30.6)	0.002	150 (48.1)
Criminal justice involvement				
Ever arrested	206 (82.4)	50 (80.6)	0.747	256 (82.1)
Ever incarcerated (≥ 3 days)	173 (69.2)	34 (54.8)	0.026	207 (66.3)
Substance use, past 3 mo				
Injection drug use	177 (70.8)	2 (4.1)	<0.001	179 (59.9)
Injected heroin	163 (65.2)	1 (1.6)	<0.001	164 (52.2)
Smoked crack cocaine	209 (83.6)	10 (16.1)	<0.001	219 (70.2)
Sniff/snorted cocaine	49 (19.6)	8 (12.9)	0.222	57 (18.3)
Swallowed or snorted prescription opioid pills*	71 (28.4)	11 (17.7)	0.082	82 (26.3)
Swallowed or snorted benzodiazepines*	73 (29.2)	4 (6.5)	0.001	77 (24.7)
Binge drinking (≥ 4 drinks in one sitting)†	85 (34.0)	31 (50.0)	0.02	116 (37.2)
HIV outcomes				
HIV infection	13 (5.2)	25 (40.3)	<0.001	38 (12.2)
If HIV positive, diagnosed	7 (53.9)	22 (88.0)	0.019	29 (76.3)
Saw HIV provider in the past 6 mo	6 (85.7)	19 (86.4)	0.965	25 (86.2)
Currently taking HIV medications	4 (57.1)	17 (77.3)	0.299	21 (72.4)
STI				
CT	25 (10.0)	11 (17.5)	0.127	36 (11.5)
GC	30 (12.0)	6 (9.5)	0.509	36 (11.5)
Trichomoniasis	117 (46.8)	9 (14.3)	<0.001	126 (40.3)

*Used not as prescribed by a doctor (ie, illicit use).

†Past 12 months.

TABLE 1. Sociodemographic Characteristics, Structural Vulnerability, Substance Use, and HIV/STIs Among Female Sex Workers in Baltimore, MD (N = 312): Comparison of CFSW With TFSW, N (%)

Drug use patterns in the past 3 months differed greatly between CFSW and TFSW ([Table 1](#)). Injecting heroin (65% vs. 2%, $P < 0.001$), smoking crack cocaine (84% vs. 13%, $P < 0.001$), and illicit benzodiazepine use (29% vs. 6%, $P < 0.001$) were higher among CFSWs. A minority (18%) of CFSWs who injected drugs engaged in receptive syringe sharing in the past 3 months (32/177). Binge drinking in the past year was higher among TFSWs compared with CFSWs (52% vs. 34%, $P < 0.001$).

Women from both communities reported high rates of lifetime physical and sexual violence from a number of perpetrators. Childhood sexual abuse was common among CFSWs and TFSWs (33% vs. 37%, $P = 0.58$). Physical abuse during childhood was more common among CFSWs compared with TFSWs (41% vs. 27%, $P = 0.028$).

HIV and STI Infection

HIV prevalence was considerably higher among TFSWs compared with CFSWs (40% vs. 5%, $P < 0.001$) ([Table 1](#)). Although TFSWs were more likely to have self-reported having been previously diagnosed compared with CFSWs (88% vs. 54%, $P < 0.001$), for those already diagnosed there were no significant differences in HIV care outcomes, such as having seen an HIV provider in the past 6 months (85% vs. 86%, $P = 0.97$) and taking HIV medications (57% vs. 77%, $P = 0.30$). CFSWs and TFSWs were comparable in CT (10% vs. 18%, $P = 0.13$) and GC (12% vs. 10%, $P = 0.51$) prevalence; however, prevalence of trichomonas among CFSWs was significantly higher than that among TFSWs (47% vs. 14%, $P < 0.001$).

Sex Work Experiences and Risk Environment

Compared with TFSWs, CFSWs were older at entry into street-based sex work (25 years vs. 18 years, $P < 0.001$) and less likely to be a minor at street-based sex work entry (21% vs. 56%, $P < 0.001$) ([Table 2](#)).

Compared with TFSWs, CFSWs were much more likely to work to get drugs (86% vs. 11%, $P < 0.001$) and to financially support others (26% vs. 8%, $P = 0.003$). Compared with CFSWs, TFSWs were more likely to engage for extra spending money (70% vs. 29%, $P < 0.001$) or because there were no other job opportunities (37% vs. 13%, $P < 0.001$). Needing money for basic necessities was important for both groups (66%). Twenty-two percent of TFSWs engaged in sex work to pay for hormones or other transition-related therapy.

	CFSW (N = 250)	TFSW (N = 62)	P	Total (N = 312)
Sex work history				
Age entered street-based sex work, mean (SD)	25 (9)	18 (5)	<0.001	23 (9)
Minor at sex work entry (age <18)	53 (21.2)	34 (54.8)	<0.001	87 (27.9)
Entered sex work due to coercion/force/fraud	20 (8.0)	3 (4.7)	0.364	23 (7.3)
Ever had a "pimp"/manager	24 (9.6)	3 (4.8)	0.233	27 (8.7)
In street-based sex work for >5 yrs	129 (51.6)	38 (61.3)	0.171	167 (53.5)
Where clients ever found				
Outdoor (eg, street, park, car, and barndominiums)	250 (100.0)	62 (100.0)	—	314 (100.0)
Indoor (eg, bars and exotic dance clubs)	120 (48.0)	25 (40.3)	0.255	145 (46.5)
Referrals	110 (44.0)	28 (45.2)	0.909	138 (44.2)
Online (eg, web sites, classifieds, and social media)	69 (27.6)	40 (64.5)	<0.001	109 (34.9)
Current sex work				
Reasons for current sex work				
To get drugs	215 (86.0)	6 (9.7)	<0.001	221 (70.8)
To financially support others (eg, children)	64 (25.7)	5 (8.1)	0.003	69 (22.2)
Basic necessities (eg, housing, food, and bills)	160 (64.0)	44 (71.0)	0.302	204 (65.4)
Extra spending money	73 (29.2)	42 (67.7)	<0.001	115 (36.9)
No other job opportunities	33 (13.2)	24 (38.7)	<0.001	57 (18.3)
To pay for hormones/transition-related treatment	0 (0.0)	13 (21.0)	—	—
To pay off a debt	26 (10.4)	8 (12.9)	0.571	34 (10.9)
Client interactions, past 3 mo				
Had male clients	247 (98.8)	62 (100.0)	—	309 (99.4)
Condomless sex with clients (vaginal/anal)	98 (39.2)	7 (10.9)	<0.001	105 (33.4)
Had police officers as clients	41 (16.7)	23 (38.3)	<0.001	64 (20.9)
Police interactions				
Frequency of police encounters: ≥weekly	99 (39.6)	24 (38.7)	0.88	123 (39.4)
Ever provided information to the police	33 (13.2)	14 (22.6)	0.065	47 (15.1)
To avoid arrest or trouble	25 (83.3)	7 (63.6)	0.177	32 (78.1)
Ever been a paid informant	11 (4.4)	6 (9.8)	0.096	17 (5.5)
Behavioral change due to policing, past 12 mo				
Avoided carrying condoms to avoid police	35 (14.1)	6 (9.7)	0.362	41 (13.2)
Moved to an unfamiliar area to avoid police	55 (22.1)	19 (30.7)	0.157	74 (23.8)
Rushed negotiations because of policing	137 (54.8)	31 (48.4)	0.363	168 (53.5)
Client violence				
Physical, ever	115 (46.0)	25 (40.3)	0.406	140 (44.9)
Sexual, ever	124 (49.6)	30 (48.4)	0.864	154 (49.4)
Police violence				
Physical, ever	64 (25.6)	19 (29.7)	0.508	83 (26.4)
Sexual, ever	59 (23.6)	21 (32.8)	0.131	80 (25.5)

TABLE 2. Sex Work Risk Environment of Female Sex Workers in Baltimore, MD (N = 312): Comparison of CFSW With TFSW, N (%)

Almost all women primarily reported having male clients in the past 3 months (Table 2). Condomless vaginal/anal sex with clients in the past 3 months was more common among CFSW than TFSW (39% vs. 10%, $P < 0.001$). TFSWs were more likely to have police as clients (40% vs. 16%, $P < 0.001$).

Both CFSWs and TFSWs had high levels of police encounters and reported having given information to the police, mostly to "avoid arrest or trouble" (Table 2). A minority had been a paid informant for the police. Both groups reported changes to their routine work as a result of policing in the past 12 months; avoiding carrying condoms moving to an unfamiliar area to avoid police and rushing negotiations with clients were common. Among both populations, many women were exposed to client and police violence in their lifetime without significant differences between the 2 groups.

Correlates of HIV Infection Among CFSWs and TFSWs

We found that, in adjusted multivariable analysis, significant correlates of having HIV infection among CFSWs were cocaine injection [adjusted odds ratio (aOR) = 3.65, 95% confidence interval (CI): 1.12 to 11.88], food insecurity (aOR = 1.92, 95% CI: 1.22 to 3.04), and >5 years in sex work (aOR = 5.40, 95% CI: 2.10 to 13.90) (Table 3).

	CFSW (N = 249)				TFSW (N = 62)			
	OR (95% CI)	P	aOR (95% CI) [‡]	P	OR (95% CI)	P	aOR (95% CI) [‡]	P
Demographics								
Age (per year)	0.99 (0.97 to 1.01)	0.29			1.14 (1.12 to 1.16)	<0.001		
Relationship status (single)	1.72 (0.52 to 5.69)	0.374			1.72 (0.99 to 2.98)	0.055		
Childhood abuse								
Childhood physical abuse	1.17 (0.39 to 3.53)	0.781			0.62 (0.59 to 0.66)	<0.001		
Childhood sexual abuse	0.57 (0.18 to 1.80)	0.334			3.39 (2.73 to 4.21)	<0.001	4.56 (1.20 to 17.32)	0.026
Drug use								
Cocaine injection, past 3 mo	3.93 (1.09 to 14.18)	0.036	3.65 (1.12 to 11.88)	0.032				
Crack cocaine smoking, past 3 mo	2.45 (0.37 to 16.01)	0.35			2.61 (1.43 to 4.75)	0.002		
Receptive syringe sharing, past 3 mo	2.12 (0.51 to 8.80)	0.3						
Structural vulnerability								
Did not complete high school/Graduate Education Development	1.07 (0.37 to 3.08)	0.898			1.52 (1.08 to 2.14)	0.017		
Homeless, past 3 mo	0.50 (0.17 to 1.44)	0.199			0.51 (0.21 to 1.27)	0.15		
Legally unemployed, past 3 mo	1.06 (0.27 to 4.10)	0.938			4.26 (3.63 to 5.00)	<0.001		
Food insecurity (>weekly)	2.00 (1.39 to 2.87)	<0.001	1.92 (1.22 to 3.04)	0.005	1.60 (0.78 to 3.27)	0.198		
Ever arrested*	—	—			2.36 (1.98 to 2.80)	<0.001		
Risk environment								
Minor at entry into street-based sex work	3.45 (2.91 to 4.08)	<0.001			1.08 (0.88 to 1.34)	0.464		
Length in street-based sex work (>5 yrs)	5.50 (2.24 to 13.48)	<0.001	5.40 (2.10 to 13.90)	<0.001	6.18 (5.34 to 7.15)	<0.001	5.62 (1.44 to 21.85)	0.013
Entered sex work to get drugs	4.66 (0.68 to 31.74)	0.116			2.83 (2.29 to 3.51)	<0.001		
Entered sex work for extra spending money	2.25 (0.74 to 6.78)	0.151			1.02 (0.62 to 1.67)	0.937		
In sex work due to no other job opportunities	0.53 (0.07 to 4.10)	0.544			3.93 (1.37 to 11.29)	0.011	4.81 (1.29 to 17.90)	0.019
Ever provided information to police	1.20 (0.15 to 9.66)	0.862			3.20 (0.93 to 11.02)	0.065		
Rushed negotiations because of policing	0.23 (0.06 to 0.83)	0.026			0.34 (0.12 to 0.96)	0.042		
Moved to an unfamiliar area to avoid police	0.28 (0.05 to 1.52)	0.141			0.26 (0.07 to 0.89)	0.032		
Condomless sex								
Condomless vaginal sex—clients [†]	0.74 (0.12 to 4.76)	0.754			—	—		
Condomless anal sex—clients	0.95 (0.12 to 7.25)	0.958			1.55 (1.28 to 1.86)	<0.001		
Condomless vaginal sex—intimate partners [†]	0.56 (0.37 to 0.87)	0.009			—	—		
Condomless anal sex—intimate partners	0.41 (0.08 to 2.22)	0.3			0.37 (0.31 to 0.44)	<0.001		
Logistic regression with zone-clustered variance. Only displayed if bivariate association among either CFSW or TFSW was significant ($P < 0.2$). *Could not model association due to no variability: all (n = 13) with HIV had been arrested. [†] Could not model association in TFSW sample due to low condomless vaginal sex, cell size = 1. [‡] Backward stepwise selection.								

TABLE 3. Correlates of HIV Infection Among CFSW and TFSW in Baltimore, MD: Results From Bivariate and Multivariate Logistic Regression Models

Correlates of HIV Infection Among TFSWs

The crude and adjusted associations between HIV infection and key variables among TFSWs are displayed in [Table 3](#). Among TFSWs, adjusted multivariable analysis revealed independent associations between having HIV infection and childhood sexual abuse (aOR = 4.56, 95% CI: 1.20 to 17.32), being in sex work due to no other job opportunities (aOR = 4.81, 95% CI: 1.29 to 17.90), and >5 years in sex work (aOR = 5.62, 95% CI: 1.44 to 21.85).

DISCUSSION

This study is one of the first to examine HIV prevalence and its correlates among street-based CFSW and TFSW populations. We found a substantial difference in HIV prevalence in TFSWs compared with CFSWs. Despite CFSWs being more likely to have experienced known HIV risks such as condomless sex, injection drug use, and financial, food, and housing insecurity, TFSWs had almost 8-fold higher HIV prevalence. These ostensibly contradictory findings highlight the importance of an intersectional analytic lens. Baltimore is a city rife with racial disparities where the majority burden of HIV is borne by black residents. The 40% HIV prevalence is consistent with prior community-based studies with black transgender women.[55](#) Given the different racial demographics by gender identity in this study, our findings could suggest how experiences of race and racism may intersect with transphobia to compound HIV risk beyond traditional risk factors.

Our results indicate both populations are characterized by a number of HIV risk vulnerabilities.[53](#) Both populations shared a common trajectory of violence, with similar early experiences of childhood abuse, followed in later life by similar levels of client violence, a finding consistent with similar studies of the associations between the cycle of early life and subsequent violence.[56,57](#) As such, in adjusted analysis, we found childhood abuse was strongly associated with HIV infection in TFSWs. Both groups were characterized by social and economic disadvantage including low levels of education and legal employment. However, the sociostructural drivers underlying these shared vulnerabilities are complex. For instance, the vast majority of TFSWs were black, compared with a predominantly white CFSW population in this setting. The literature points to the intersection of race and gender identity in shaping trans women's early experiences of discrimination at school and dropout rates, further compounding later life legal job opportunities and potentially driving early entry to sex work.[58-60](#)

Among CFSWs, HIV risk appeared to be closely linked to widespread drug use within the population. In adjusted analysis, those reporting injection of cocaine were nearly 4 times more likely to be HIV positive than the rest of the population. This finding highlights the complex interplay between sex work and drug use within the CFSW community and suggests that any interventions for this community need to target the high rates of drug use in tandem. By contrast, among TFSWs, injection drug use was rarer and although increased parenteral exposure to HIV could result from shared needles for hormone use, it has previously been found that reports of needle sharing are low.[25,60](#)

Entry into sex work was similarly driven by distinct risk trajectories. For TFSWs, the lack of other job opportunities and a desire to meet day-to-day financial needs, including hormone or other transition-related therapy, dominated the reasons for entering sex work. Conversely, CFSW reported needing money predominantly for drugs. Funding an addiction appeared to erode any day-to-day financial stability CFSW may have had around basic necessities that engaging in sex work could provide. Hence, CFSW reported more immediate day-to-day structural vulnerability, including past 3-month homelessness and going to sleep hungry. The fact that TFSWs in this study were younger and more frequently entered sex work as minors points to the underlying role of early-life structural vulnerabilities shaping transgender women's risk trajectory, including early-life stigma in both the home and in the community and the subsequent gender affirmation obtained through sex work.

We found that all the CFSWs with HIV infection and virtually all the TFSWs with HIV infection had been arrested in their lifetime. This is consistent with findings in other studies investigating the role of policing on CFSW's HIV risk.⁶¹ Although the rates of arrest were also high in women who were not living with HIV, consistent with the criminalization of sex work in this setting, these findings support the key role that law enforcement approaches may play in affecting the risk environment in which women operate. In addition, both CFSWs and TFSWs reported having police as clients. Referring to police as "clients" minimizes the innate power differences, which in the context of sex work criminalization impacts women's ability to manage risk.³¹ The fact that many police in this setting are engaging TFSW and CFSW for services is supported by other studies.^{9,18,38,61} In this study, the number of egregious behaviors and assaults at the hands of the police was consistent across both populations, underscoring women's situational vulnerability to police exploitation. Police culture is complicit in these transgressions that not only rarely result in punishment but also erode women's ability to self-protect (eg, selling sex in a familiar area and time for safer negotiations) and further compromises their safety.

Nearly all the TFSWs living with HIV already knew their serostatus and already had some contact with HIV care services. These participants were also much more likely to use condoms with their intimate partners than participants who were HIV negative, consistent with wanting to protect their partners from infection.⁶² This finding highlights the importance of identifying individuals living with HIV, not only to facilitate entry into treatment services for their own health but also to help prevent onward transmission. Given the substantial HIV burden within this community, promoting HIV testing among TFSWs and their clients as well as access to pre-exposure prophylaxis could collectively have a marked impact on the HIV epidemic within the TFSW community.

The study is characterized by several limitations. The results from this analysis come from cross-sectional data. This means that we could not assess temporality. Longitudinal studies are needed to more robustly identify drivers of HIV vulnerability. Nevertheless, our approach allowed us to identify key correlates of HIV infection. There may also be other drivers of HIV risk that were not captured by our study. In particular, the size of the populations and the extent to which they are interlinked may be an important driver of viral spread in the communities, especially for TFSWs. Studies that attempt to capture the structure of the sexual networks, including the clients, are needed to better understand this potentially key aspect of risk. Furthermore, owing to the modest sample size of the cohort, we caution that there is a level of uncertainty in the estimates as reflected by the CIs.

Our TFSW sample was largely African American, which is characteristic of street-based TFSW in Baltimore but limits our ability to generalize to white TFSW populations. Similarly, the CFSW sample was predominantly white, which is surprising given the fact that African Americans are a majority in Baltimore. We hypothesize that there were fewer African-American women for several reasons. First, the study did not include FSWs who exclusively find clients through other mediums (eg, online classifieds, bars and clubs, and word-of-mouth) and choose to avoid working the strolls. Second, given our use of targeting sampling, we did not recruit from areas of the city that had lower or more diffuse levels of sex work activity. African-American CFSWs may be more likely to avoid the higher sex work areas to reduce the likelihood of attracting unwanted attention. In both of these cases, we surmise that these types of choices may be driven by FSW's perceptions around safety and the likelihood of arrest given the targeting of communities of color by law enforcement and higher rates of violent crimes in predominantly African-American neighborhoods that exist in Baltimore.

CONCLUSIONS

In addition to quantifying the level of HIV in 2 highly vulnerable populations, this study has identified key correlates of HIV risk and underlined the multilayered nature of these populations' structural vulnerability. Highlighting the distinctions in structural factors that contribute to HIV risk among CFSWs and TFSWs are critical to targeted deployment of intervention components within sex worker communities.

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Key Words: HIV; transgender female sex workers; cisgender female sex workers; female injection drug users; sexual violence; physical violence

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Table 3

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